INDEX TO PLATING VOL. 56, 1969

A

ABS, Chromium-Plated, and Polypropylene Plastics: Performance in Typical Tests, W. P. Innes, J. J. Grunwald, E. D. D'Ottavio, W. H. Toller and C. Carmichael . . 51
Acid Zinc Plating Solutions for Decorative Applications, E. B. Saubestre, J. Hajdu and J. Zehnder . . 691

AES

AES Annual Financial Report . . 833
AES Branch Directory . . 1268
AES Constitution and Bylaws . . 73
AES Environmental Pollution Control Subcommittee, The Control of Cyanides in Plating Shop Effluents . . 1107
AES Expands Educational Program (Editorial)D. A. Swalheim . . 877
AES Exposition Showcase (Editorial) . . 226
Annual Report for 1968-69 . . 592
Convention Greetings . . 571
Convention Program, 56th Annual AES . . 573, 728
Exhibitors at the AES 7th Industrial Finishing Exposition . . 582
Format of a Convention, The (Editorial), J. F. Siefen . . 455
Getting More From the National Convention (Editorial), M. E. Browning . . 342
Nominating Committee's Selection of Nominees for 1969 Election . . 192
Paper Award Winners . . 827
Pride and Prestige, Of—Practical Values (Editorial), E. A. Blount . . 6
Proposed Amendments to AES Bylaws . . 1265
Quarterly Research Report, E. J. Seyb . . 68, 407, 823
Report on 56th Annual AES Convention in Detroit . . 938
Technical Program Abstracts, AES Convention . . 575
Technical Program, 56th Annual AES Convention . . 415
We Have a Job To Do! (Editorial), R. S. Modjeska . . 989
Affairs of the Society (Editorial) . . 1195
Air Pollution and the Metal Finishing Industry, A. F. Mohrnheim . . 291

ALLOYS

Alloys, Al-Mn, Al-Fe, AlMgSi, Al-Cr, The Behavior of Intermetallic Compounds in Aluminum During Sulfuric Acid Anodizing, J. Cote, E. E. Howlett, M. J. Wheeler and H. J. Lamb . . 386
Alloys, The Electrodeposition of Thick Deposits of Gold-Copper,: Process Development, H. J. Wiesner and W. P. Frey . . 527
Alloys, Physical and Mechanical Properties of Electroformed Gold-Copper, H. J. Wiesner and W. B. Distler . . 799
Alloys, Nickel-Iron, Electrodeposited from a Sulfate Chloride Electrolyte: The Effects on Mechanical Properties and Microstructure of Stress-Reducing Agent, Heat Treatment, pH, and Chemical Composition, E. M. Levy . . 903

ALUMINUM

Aluminum Alloys, High Acetic Acid Salt Spray Test for, R. C. Spooner . . 1047
Aluminum, Anodizing of, in Dioxane-Water Solutions of Oxalic Acid, L. Campanella . . 57
Aluminum, Anodizing of, in Molten Alkali Nitrates: Physical Properties of Films, L. Campanella and A. Conte . . 815
Aluminum, The Behavior of Intermetallic Compounds in, During Sulfuric Acid Anodizing: 1: Al-Mn, Al-Fe, AlMgSi, Al-Cr Alloys, J. Cote, E. E. Howlett, M. J. Wheeler and H. J. Lamb . . 386
Aluminum, Anodized, Electrolyte Modifications for Improved Coating Durability on, G. A. Dorsey Jr. . . 180
Aluminum, Bright Anodized, Temperature Control Coatings: Effect of Vacuum-Ultraviolet Environment on Optical Properties, J. H. Weaver . . 271
Aluminum Coatings, Applying Hard Anodic, to Various Substrates, H. R. Johnson . . 931
Aluminum, Electrodeposition of, F. A. Clay, W. B. Harding and C. J. Stimetz . . 1027
Aluminum, Electrolyte Modifications for Improved Coating Durability on, G. A. Dorsey Jr . . 180
Aluminum, Plating on: A New Process, S. J. Beyer . . 257
Aluminum Polishing Baths, Determination of Nitric Acid in, R. H. Baugh, H. L. Vandersall and J. W. Lyons . . 185

ANODIZING

Anodic, Aluminum Coatings, Applying Hard, to Various Substrates, H. R. Johnson . . 931
Anodic Coatings:, Hard, Characteristics, Applications, and Some Recent Studies on Processing and Testing, D. J. George and J. H. Powers . . 1240
Anodized, Aluminum, Bright, Temperature Control Coatings: Effect of Vacuum-Ultraviolet Environment on Optical Properties, J. H. Weaver . . 271
Anodized Aluminum, Electrolyte Modifications for Improved Coating Durability on, G. A. Dorsey Jr. . . 180
Anodizing:, Behavior of Intermetallic Compounds in Aluminum During Sulfuric Acid, The, 1: Al-Mn, Al-Fe, AlMgSi, Al-Cr Alloys, J. Cote, E. E. Howlett, M. J. Wheeler and H. J. Lamb . . 386
Anodizing of Aluminum in Dioxane-Water Solutions of Oxalic Acid, L. Campanella . . 57
Anodizing of Aluminum in Molten Alkali Nitrates: Physical Properties of Films, L. Campanella and A. Conte . . 813
Amodio, P. R. and N. Feldstein
Influence of Agitation on Electroless Plating . . 1246
Analysis of Electroplated Metals by Atomic Absorption Spectrometry, T. Y. Kometani . . 1251
Analytical Control in Electroplating Technology, H. A. Heller . . 277
Analytical Investigations of Defective Electroplated Parts, T. H. Briggs and R. W. Steinmetz . . 163
Andrews, R. L., C. B. Kenahan, G. R. Smith, and D. Schlain
Electrodeposition of Rhodium from a Molten Sodium Cyanide Electrolyte . . 805
Antler, M.
Gold-Plated Contacts: Effect of Substrate Roughness on Reliability . . 1139
Application of a Direct Tensile Joint Strength Test to Electroless Plated Plastic, The, N. F. Murphy and E. F. Swansey . . 371
Applying Hard Anodic Aluminum Coatings to Various Substrates, H. R. Johnson . . 931

ASTM

Meeting of ASTM Committee B-8, E. B. Saubestre . . 408
Solderability of Tin Coated Brass: Subcommittee V, ASTM Committee B-8 . . 819
Atkinson, J. T. N. and A. L. Mular
Experimental Design and Optimization in Electroplating . . 1254

AUTHORS

Amodio, P. R. . . 1250
Andrews, R. L. . . 808
Antler, M. . . 1163
Atkinson, J. T. N. . . 1258
Bartlett, B. C. . . 191
Baugh, R. H. . . 187
Bednar, J. . . 1163
Bellinger, K. P. . . 1138
Beyer, S. J. . . 66, 261
Bodnevas, A. . . 1150
Bogenschütz, A. F. . . 404
Branciaroli, J. P. . . 64
Breen, J. E. . . 812
Briggs, T. H. . . 191
Brown, H. . . 1239
Campanella, L. . . 59, 818
Cann, L. . . 191
Carmichael, C. T. . . 65
Carter, P. R. . . 721
Castle, D. J. . . 933
Cesaro, J. N. L. . . 270
Clay, F. A. . . 1050
Conn, G. A. . . 1051
Conte, A. . . 818
Cooley, R. L. . . 515
Copps, T. P. . . 536
Cote, J. . . 394
Cramer, S. . . 550
Darlington, C. G. . . 704
Dingley, W. . . 1163
Distler, W. B. . . 804
Donaldson, J. G. . . 721
Dorsey, G. A., Jr. . . 184
D'Ottavio, E. D. . . 65
Duffek, E. F. . . 550
Epelboin, I. . . 1362
Farmer, M. F. . . 704, 818
Feldstein, N. . . 1250
Fischer, H. . . 1259
Flühmann, W. . . 1355
Frey, W. P. . . 532
Froment, M. . . 1362
George, D. J. . . 1245
Greco, V. P. . . 270
Grunwald, J. J. . . 65
Guttenplan, J. D. . . 818
Hajdu, J. . . 698
Hardesty, D. W. . . 709
Harding, W. B. . . 1050
Hayward, J. . . 191
Heller, H. A. . . 294
Helwig, L. E. . . 721
Hill, G. B. . . 176
Holbrook, K. A. . . 550
Hoover, E. W. . . 66, 933
Horner, J. D. . . 548
Howlett, E. E. . . 394
Innes, W. P. . . 64
Jayakrishnan, P. . . 817
Johnson, H. R. . . 933
Jones, M. H. . . 542
Jostan, J. L. . . 404
Kenahan, C. B. . . 808
Kenez, M. G. . . 542
Khan, A. A. . . 1380
Kometani, T. Y. . . 1253
Lalitha, K. S. . . 817
Lamb, H. J. . . 394
Lamb, V. A. . . 933
Lanza, G. P. . . 385
Lemons, K. E. . . 515
Levy, E. M. . . 536, 908
Litsch, H. J. . . 550
Logozzo, A. W. . . 1050
Lyons, J. W. . . 187
MacInnis, R. D. . . 536
Marti, J. L. . . 385
Matulis, J. . . 1150
Maurin, G. . . 1362
Meserve, H. O., Jr. . . 50
Mitchell, R. L. . . 1163
Mohrnheim, A. F. . . 292, 718
Mular, A. L. . . 1258
Munier, G. B. . . 1157
Murphy, N. F. . . 406
Nystrom, W. A. . . 290
Parthasaradhy, N. V. . . 817
Peiboda, W. W. . . 1046
Pearlstein, F. . . 1161
Powers, J. H. . . 1245
Pritchard, E. J. . . 1046
Rogers, R. R. . . 1163
Rothschild, B. F. . . 1369
Sadak, J. C. . . 1051
Sanders, D. . . 1369
Sard, R. . . 191
Saubestre, E. B. . . 698
Sautter, F. K. . . 1051
Schlain, D. . . 550, 808
Schmidt, F. J. . . 406
Smith, G. R. . . 808
Smith, W. O., Sr. . . 1375
Spooner, R. C. . . 1051
Steinmetz, R. W. . . 191
Stimetz, J. . . 1050
Stutzman, P. G. . . 64
Swansey, E. F. . . 406
Tomaszewski, L. C. . . 1239
Tomaszewski, T. W. . . 1239
Toledo, E. . . 812
Toller, W. H. . . 65
Twist, P. J. . . 550
Vainilaviciene, M. . . 1150
Vandersall, H. L. . . 187
Wallace, W. A. . . 270
Weaver, J. H. . . 294
Weightman, R. F. . . 1161
Weil, R. . . 191
West, D. C. . . 704
Wheeler, M. J. . . 394
Whitfield, C. E., Sr. . . 1373
Wiesner, H. J. . . 532, 804
Zehnder, J. A. . . 698

B

Bartlett, B. C., L. Cann, and J. L. Hayward
Control of Phosphorus Content and Stresses in Electroless Nickel Deposits, The . . 168
Baugh, R. H., H. L. Vandersall, and J. W. Lyons
Determination of Nitric Acid in Aluminum Polishing Baths . . 185
Bednar, J., W. Dingley, and R. R. Rogers
Improved Silver Cyanide Plating Baths . . 1129
Behavior of Intermetallic Compounds in Aluminum During Sulfuric Acid Anodizing: 1: Al-Mn, Al-Fe, AlMgSi, Al-Cr Alloys, The, J. Cote, E. E. Howlett, M. J. Wheeler and H. J. Lamb . . 386
Behavior of Lead Anodes in Chromium Plating Solutions, The, D. W. Hardesty . . 705
Bellinger, K. P.
Practical Neutral Chloride Zinc Plating . . 1135
Beyer, S. J.
Electroforming a Mold Cavity for Injection Molding . . 60
Plating on Aluminum: A New Process . . 257
Black Chrome Plating: Application and Deposit Characteristics of a New Plating Process, J. P. Branciaroli and P. G. Stutzman . . 37
Blount, E. A.
Of Pride and Prestige—Practical Values (Editorial) . . 6
Can the Small Plating Shop Survive? (Editorial) . . 765

Problem: To "Sell" the Electroplating Industry (Editorial) 1097
Blum Lecture, Tenth William—Nucleation Dependent Growth Layer, The—A Structure Element in Electrocrystallization, H. Fischer 1229
Bodnevas, A., J. Matulis, and M. Vainilaviciene
Influence of Class II Brighteners on the Nature of Saccharin Decomposition in Nickel Electrodeposition 1147
Bogenschütz, A. F. and J. L. Jostan
Electroforming of Extremely Smooth Metallic Substrates for Application in Microelectronics 399
Bond Strength Characteristics of Electrodeposited Nickel on Boron and Silicon Carbide Filaments (Reinforced Composites), V. P. Greco, W. A. Wallace, and J. N. L. Cesaro 262

BOOK REVIEWS

Corrosion and the Maintenance Engineer, C. L. Wilson and J. A. Oates 66
Dangerous Properties of Industrial Materials—Third Edition, N. I. Sax 66
Dielectrophoretic and Electrophoretic Deposition, H. A. Pohl and W. F. Pickard—editors 951
Electrochemical Machining, A. E. deBarr and D. A. Oliver 722
Electrochemistry for Technologists, G. R. Palin 1260
Introductory Electroplating, E. A. Ollard 1260
Jahrbuch Oberflaechentechnik (Yearbook of Surface Technology) Volume 25, 1969, J. Elze and H.-W. Lieber 1260
The Technology of Anodising Aluminum, A. W. Brace 209
Borlett, C. G.
Lost Opportunity (Editorial) 124
Branciaroli, J. P. and P. G. Stutzman
Black Chrome Plating: Application and Deposit Characteristics of a New Plating Process 37
Brass Tubes, Brush Electropolishing of, P. Jayakrishnan, N. V. Parthasaradhy and K. S. Lalitha 815
Breen, J. E. and F. Toledo
Quantitative Method for Adhesion Testing of Multilayer Printed Circuit Boards 809
Briggs, T. H. and R. W. Steinmetz
Analytical Investigations of Defective Electroplated Parts 163
Bright Anodized Aluminum Temperature Control Coatings: Effect of Vacuum-Ultraviolet Environment on Optical Properties, J. H. Weaver 271
Brown, H., L. C. Tomaszewski, and T. W. Tomaszewski
Codeposition of Finely Dispersed Particles with Metals 1234
Browning, M. E.
Getting More From the National Convention (Editorial) 342
Brush Electropolishing of Brass Tubes, P. Jayakrishnan, N. V. Parthasaradhy, and K. S. Lalitha 815
Buffing, Research on, M. Hitomi, Y. Tanaka, and Y. Tanaka, condensed and edited by K. J. Gatchel 914

C

Campanella, L.
Anodizing of Aluminum in Dioxane-Water Solutions of Oxalic Acid 57
Campanella, L. and A. Conte
Anodizing of Aluminum in Molten Alkali Nitrates: Physical Properties of Films 813
Cann, L., J. L. Hayward, and B. C. Bartlett
The Control of Phosphorus Content and Stresses in Electroless Nickel Deposits 168
Can the Small Plating Shop Survive? (Editorial), E. A. Blount 765
Carmichael, C. W. P. Innes, J. J. Grunwald, E. D. D'Ottavio, and W. H. Toller
Chromium-Plated ABS and Polypropylene Plastics Performance in Typical Tests 51
Carter, P. R. and L. E. Helwig
Improving the Solder Flow Characteristics of Galvannealed Sheet 710
Castle, D. J.
Styling and Plating—Now and the Trend 926
Cesaro, J. N. L., W. A. Wallace, and V. P. Greco
Bond Strength Characteristics of Electrodeposited Nickel on Boron and Silicon Carbide Filaments (Reinforced Composites) 262
Chemical Milling Applied to Jet Airliner Body Skins, H. O. Meserve Jr. 44
Chromate Coatings and Prevention of Galvanic Corrosion of Copper in Electronic Applications, M. E. Farmer and J. D. Guttenplan 795

CHROMIUM

Black Chrome Plating: Application and Deposit Characteristics of a New Plating Process, J. P. Branciaroli and P. G. Stutzman 37
Chromium-Plated ABS and Polypropylene Plastics: Performance in Typical Tests, W. P. Innes, J. J. Grunwald, E. D. D'Ottavio, W. H. Toller, and C. Carmichael 51
Chromium Plating, Racking for Hard, A. W. Logozzo 1019
Chromium Plating Solutions, The Behavior of Lead Anodes in, D. W. Hardesty 705
Clay, F. A., W. B. Harding, and C. J. Stimetz
Electrodeposition of Aluminum 1027
Coating, Improved, Durability on Anodized Aluminum, Electrolyte Modifications for, G. A. Dorsey Jr. 180
Chromate Coatings and Prevention of Galvanic Corrosion of Copper in Electronic Applications, M. E. Farmer and J. D. Guttenplan 795
Codeposition of Finely Dispersed Particles with Metals, T. W. Tomaszewski, L. C. Tomaszewski, and H. Brown 1234
Complete Removal of Chromic Acid Waste With the Aid of Instrumentation, G. B. Hill 172
Conn, G. A.
Ruthenium Plating 1038
Conte, A. and L. Campanella
Anodizing of Aluminum in Molten Alkali Nitrates: Physical Properties of Films 813
Continuous Spectrophotometric Analysis of a Watts Type Cobalt-Nickel Electrolyte, J. C. Sadak and F. K. Sautter 1041
Controlling Gold Consumption in Electroplating, J. G. Donaldson 719
Control of Phosphorus Content and Stresses in Electroless Nickel Deposits, The, B. C. Bartlett, L. Cann, and J. L. Hayward 168
Cooley, R. L. and K. E. Lemons
Densities of Electroplated Gold 511

1968 CONVENTION PAPERS

Acid Zinc Plating Solutions for Decorative Applications, E. B. Saubestre, J. Hajdu, and J. Zehnder 691
Analytical Control in Electroplating Technology, H. A. Heller 277
Analytical Investigations of Defective Electroplated Parts, T. H. Briggs and R. W. Steinmetz 163
Application of a Direct Tensile Joint Strength Test to Electroless Plated Plastic, The, N. F. Murphy and E. F. Swansey 371
Black Chrome Plating: Application and Deposit Characteristics of a New Plating Process, J. P. Branciaroli and P. G. Stutzman 37
Bond Strength Characteristics of Electrodeposited Nickel on Boron and Silicon Carbide Filaments (Reinforced Composites), V. P. Greco, W. A. Wallace, and J. N. L. Cesaro 262
Bright Anodized Aluminum Temperature Control Coatings: Effect of Vacuum-Ultraviolet Environment on Optical Properties, J. H. Weaver 271
Chemical Milling Applied to Jet Airliner Body Skins, H. O. Meserve Jr. 44
Chromate Coatings and Prevention of Galvanic Corrosion of Copper in Electronic Applications, M. E. Farmer and J. D. Guttenplan 795
Chromium-Plated ABS and Polypropylene Plastics: Performance in Typical Tests, W. P. Innes, J. J. Grunwald, E. D. D'Ottavio, W. H. Toller, and C. Carmichael 51
Complete Removal of Chromic Acid Waste With the Aid of Instrumentation, G. B. Hill 172
Control of Phosphorus Content and Stresses in Electroless Nickel Deposits, The, B. C. Bartlett, L. Cann, and J. L. Hayward 168
Densities of Electroplated Gold, R. L. Cooley and K. E. Lemons 511
Electroplating the New Generation of Microelectronic Devices, E. F. Duffek 505
Iron Plating from the Fluoborate Bath Without Organic Additions, M. E. Farmer, D. C. West, and C. G. Darlington 699
Mechanical Properties of Single-Crystal Copper Electrodeposits, R. Sard and R. Weil 157
Plating on Aluminum: A New Process, S. J. Beyer 257

1969 CONVENTION PAPERS

Codeposition of Finely Dispersed Particles with Metals, T. W. Tomaszewski, L. C. Tomaszewski, and H. Brown 1234
Electrodeposition of Aluminum, F. A. Clay, W. B. Harding, and C. J. Stimetz 1027
General Rack Design, R. L. Mitchell 1145
Gold-Plated Contacts: Effect of Substrate Roughness on Reliability, M. Antler 1139
Hard Anodic Coatings: Characteristics, Applications, and Some Recent Studies on Processing and Testing, D. J. George and J. H. Powers 1240
Improved Silver Cyanide Plating Baths, W. Dingley, J. Bednar, and R. R. Rogers 1129
Practical Neutral Chloride Zinc Plating, K. P. Bellinger 1135
Racking for Hard Chromium Plating, A. W. Logozzo 1019
Recovery of Gold From Rinse Waters Using Ion-Exchange Techniques, E. J. Pritchard and W. W. Pcihoda 1044
Ruthenium Plating, G. A. Conn 1038
Tenth William Blum Lecture—The Nucleation Dependent Growth Layer—A Structure Element in Electrocrystallization, H. Fischer 1229
Copper, Chromate Coatings and Prevention of Galvanic Corrosion of, in Electronic Applications, M. E. Farmer and J. D. Guttenplan 795
Copper Electrodeposits, Mechanical Properties of Single-Crystal, R. Sard and R. Weil 157
Copps, T. P., E. M. Levy, and R. D. MacInnis
Iron Electrodeposited from a Sulfate-Chloride Electrolyte: Effects on Microstructure and Microhardness of Current Density, Temperature, pH, and Chloride Ion Concentration 533
Cote, J., E. E. Howlett, M. J. Wheeler, and H. J. Lamb
The Behavior of Intermetallic Compounds in Aluminum During Sulfuric Acid Anodizing: 1: Al-Mn, Al-Fe, AlMgSi, Al-Cr Alloys 386
Cramer, S. D. and D. Schlain
Electrodeposition of Palladium and Platinum From Aqueous Electrolytes 516
Cross, I.
Some Production Plating Problems and How They Were Solved: Part XXII 293

D

Darlington, C. G., D. C. West, and M. E. Farmer
Iron Plating from the Fluoborate Bath Without Organic Additions 699
Densities of Electroplated Gold, R. L. Cooley and K. E. Lemons 511
Dent, M. H.
Good Year, A, (Editorial) 654
Determination of Nitric Acid in Aluminum Polishing Baths, R. H. Baugh, H. L. Vandersall, and J. W. Lyons 185
Dingley, W., J. Bednar, and R. R. Rozers
Improved Silver Cyanide Plating Baths 1129

DISCUSSIONS

Analytical Control in Electroplating Technology, R. L. Cooley 1050
Electropolishing Nickel at High Current Densities in Sulfuric Acid, T. C. Franklin, E. Kozinsky, and M. Beasley 932
Properties of Some Gold Electrodeposits, R. Duva and D. G. Foulke 1162
Waste Treatment in Metal Finishing: U. S. and European Practices, J. F. Zievers, R. W. Crain, and F. G. Barclay 932
Distler, W. B. and H. J. Wiesner
Physical and Mechanical Properties of Electroformed Gold-Copper Alloys 799
Donaldson, J. G.
Controlling Gold Consumption in Electroplating 719
Dorsey, G. A. Jr.
The Effect of Anodizing Electrolytes on Anodic Alumina Structure and Coating Durability 177
Electrolyte Modifications for Improved Coating Durability on Anodized Aluminum 180
D'Ottavio, E. D., W. H. Toller, C. Carmichael, W. P. Innes, and J. J. Grunwald
Chromium-Plated ABS and Polypropylene Plastics: Performance in Typical Tests 51
Duffek, E. F.
Electroplating the New Generation of Microelectronic Devices 505

E

EDITORIALS

AES Expands Educational Program, D. A. Swalheim 877
AES Exposition Showcase, R. Leeds 226
Affairs of The Society 1195
Can the Small Plating Shop Survive?, E. A. Blount 765
Format of a Convention, The, J. F. Siefen 455
Getting More From the National Convention, M. E. Browning 342
Good Year, A, M. H. Dent 654
Lost Opportunity, C. G. Borlet 124
Of Pride and Prestige—Practical Values, E. A. Blount 6
Problem: To "Sell" the Electroplating Industry, E. A. Blount 1097
We Have a Job To Do!, R. S. Modjeska 989
Your Society Copes With Change, 1319
Effect of Anodizing Electrolytes on Anodic Alumina Structure and Coating Durability, The, G. A. Dorsey Jr. 177
Electrocrystallization, Growth and Structure of Metals Obtained by, I. Epelboin, M. Froment and G. Maurin 1356

ELECTROFORMING

Electroforming a Mold Cavity for Injection Molding, S. J. Beyer 60
Electroforming of Extremely Smooth Metallic Substrates for Application in Microelectronics, J. L. Jostan and A. F. Bogenschütz 399
Physical and Mechanical Properties of Electroformed Gold-Copper Alloys, H. J. Wiesner and W. B. Distler 799

Electroless Nickel Deposition: Effect of Organic Salts on Rate, K. A. Holbrook and P. J. Twist ... 523
Electroless Palladium Deposition, F. Pearlstein and R. F. Weightman ... 1158
Electroless Plating, Influence of Agitation on, N. Feldstein and P. R. Amodio ... 1246
Electrolyte Modifications for Improved Coating Durability on Anodized Aluminum, G. A. Dorsey Jr. ... 180
Electrolytes, Effect of Anodizing, on Anodic Alumina Structure and Coating Durability, The, G. A. Dorsey Jr. ... 177
Electrolytes, Electrodeposition of Palladium and Platinum From Aqueous, S. D. Cramer and D. Schlain ... 516

ELECTRONICS SYMPOSIUM

Analysis of Electroplated Metals by Atomic Absorption Spectrometry, T. Y. Kometani ... 1251
Electroless Palladium Deposition, F. Pearlstein and R. F. Weightman ... 1158
Influence of Agitation on Electroless Plating, N. Feldstein and P. R. Amodio ... 1246
Polymer Codeposited With Gold During Electroplating, G. Munier ... 1151
Wear-Resistance of Gold Alloy Electrodeposits, W. Flühmann ... 1351
Epelboin, I., M. Froment, and G. Maurin
Growth and Structure of Metals Obtained by Electrocrystallization ... 1356
Experimental Design and Optimization in Electroplating, A. L. Mular and J. T. N. Atkinson ... 1254

F

Farmer, M. E., D. C. West, and C. G. Darlington
Iron Plating from the Fluoborate Bath Without Organic Additions ... 699
Farmer, M. E. and J. D. Guttenplan
Chromate Coatings and Prevention of Galvanic Corrosion of Copper in Electronic Applications ... 795
Feldstein, N. and P. R. Amodio
Influence of Agitation on Electroless Plating ... 1246
Fischer, H.
Tenth William Blum Lecture—The Nucleation Dependent Growth Layer—A Structure Element in Electrocrystallization ... 1229
Flühmann, W.
Wear-Resistance of Gold Alloy Electrodeposits ... 1351
Format of a Convention, The (Editorial), J. F. Siefen ... 455
Frey, W. P. and H. J. Wiesner
The Electrodeposition of Thick Deposits of Gold-Copper Alloys: Process Development ... 527
Froment, M., I. Epelboin, and G. Maurin
Growth and Structure of Metals Obtained by Electrocrystallization ... 1356

G

Gatchel, K. J. (Condensed and edited by), M. Hitomi, Y. Tanaka and Y. Tanaka
Research on Buffing ... 914
George, D. J. and J. H. Powers
Hard Anodic Coatings: Characteristics, Application, and Some Recent Studies on Processing and Testing ... 1240
Getting More From the National Convention (Editorial), M. E. Browning ... 342

GOLD

Gold Alloy Electrodeposits, Wear-Resistance of, W. Flühmann ... 1351
Gold Consumption in Electroplating, Controlling, J. G. Donaldson ... 719
Gold-Copper Alloys, The Electrodeposition of Thick Deposits of,: Process Development, H. J. Wiesner and W. P. Frey ... 527
Gold-Copper Alloys, Physical and Mechanical Properties of Electroformed, H. J. Wiesner and W. B. Distler ... 799
Gold, Densities of Electroplated, R. L. Cooley and K. E. Lemons ... 511
Gold Deposits, Porosity Testing Techniques in, A. A. Khan ... 1374
Gold-Plated Contacts: Effect of Substrate Roughness on Reliability, M. Antler ... 1139
Gold, Recovery of, From Rinse Waters Using Ion-Exchange Techniques, E. J. Pritchard and W. W. Peiboda ... 1044
Polymer Codeposited With Gold During Electroplating, G. Munier ... 1151
Graphite, The Nucleation and Growth of Some Electrodeposited Materials on, W. A. Nystrom ... 285
Greco, V. P., W. A. Wallace, and J. N. L. Cesaro
Bond Strength Characteristics of Electrodeposited Nickel on Boron and Silicon Carbide Filaments (Reinforced Composites) ... 262
Growth and Structure of Metals Obtained by Electrocrystallization, I. Epelboin, M. Froment, and G. Maurin ... 1356
Grunwald, J. J., E. D. D'Ottavio, W. H. Toller, C. Carmichael, and W. P. Innes
Chromium-Plated ABS and Polypropylene Plastics Performance in Typical Tests ... 51
Guttenplan, J. D. and M. E. Farmer
Chromate Coatings and Prevention of Galvanic Corrosion of Copper in Electronic Applications ... 795

H

Hajdu, J., E. B. Saubestre, and J. Zehnder
Acid Zinc Plating Solutions for Decorative Applications ... 691
Hard Anodic Coatings: Characteristics, Applications, and Some Recent Studies on Processing and Testing, D. J. George and J. H. Powers ... 1240
Hardesty, D. W.
The Behavior of Lead Anodes in Chromium Plating Solutions ... 705
Harding, W. B., F. A. Clay, and C. J. Stimetz
Electrodeposition of Aluminum ... 1027
Hardness of Sulfamate Nickel Deposits, J. L. Marti and G. P. Lanza ... 377
Hayward, J. L., L. Cann, and B. C. Bartlett
The Control of Phosphorus Content and Stresses in Electroless Nickel Deposits ... 168
Heller, H. A.
Analytical Control in Electroplating Technology ... 277
Helwig, L. E. and P. R. Carter
Improving the Solder Flow Characteristics of Galvannealed Sheet ... 710
High Acetic Acid Salt Spray Test for Aluminum Alloys, R. C. Spooner ... 1047
High-Throwing Power Solder (Tin-Lead) Plating Solution, B. F. Rothschild and D. Sanders ... 1363
Hill, G. B.
Complete Removal of Chromic Acid Waste With the Aid of Instrumentation ... 172
Hitomi, M., Y. Tanaka, and Y. Tanaka
Research on Buffing (Condensed and edited by K. J. Gatchel) ... 914
Holbrook, K. A. and P. J. Twist
Electroless Nickel Deposition: Effect of Organic Salts on Rate ... 523
Hoover, E. W.
Some Production Plating Problems and How They Were Solved: Part XXI ... 61
Some Production Plating Problems and How They Were Solved: Part XXIV ... 929
Horner, J. D.
Some Production Plating Problems and How They Were Solved: Part XXIII ... 546
Howlett, E. E., J. Cote, M. J. Wheeler, and H. J. Lamb
The Behavior of Intermetallic Compounds in Aluminum During Sulfuric Acid Anodizing: 1: Al-Mn, Al-Fe, AlMgSi, Al-Cr Alloys ... 386

I

Improving the Solder Flow Characteristics of Galvannealed Sheet, L. E. Helwig and P. R. Carter ... 710
Influence of Agitation on Electroless Plating, N. Feldstein and P. R. Amodio ... 1246
Initial Stages of Nickel Deposition: II. Effect of Addition Agents, M. H. Jones and M. G. Kenez ... 537
Innes, W. P., J. J. Grunwald, E. D. D'Ottavio, W. H. Toller, and C. Carmichael
Chromium-Plated ABS and Polypropylene Plastics Performance in Typical Tests ... 51
Iron Electrodeposited from a Sulfate-Chloride Electrolyte: Effects on Microstructure and Microhardness of Current Density, Temperature, pH, and Chloride Ion Concentration, E. M. Levy, R. D. MacInnis, and T. P. Copps ... 533
Iron Plating from the Fluoborate Bath Without Organic Additions, M. E. Farmer, D. C. West, and C. G. Darlington ... 699

J

Jayakrishnan, P., N. V. Parthasaradhy and K. S. Lalitha
Brush Electropolishing of Brass Tubes ... 815
Johnson, H. R.
Applying Hard Anodic Aluminum Coatings to Various Substrates ... 931
Jones, M. H., and M. G. Kenez
Initial Stages of Nickel Deposition: II. Effect of Addition Agents ... 537
Jostan, J. L. and A. F. Bogenschütz
Electroforming of Extremely Smooth Metallic Substrates for Application in Microelectronics ... 399

K

Kenahan, C. B., G. R. Smith, R. L. Andrews and D. Schlain
Electrodeposition of Rhodium from a Molten Sodium Cyanide Electrolyte ... 805
Kenez, M. G. and M. H. Jones
Initial Stages of Nickel Deposition: II. Effect of Addition Agents ... 537
Khan, A. A.
Porosity Testing Techniques in Gold Deposits ... 1374
Kometani, T. Y.
Analysis of Electroplated Metals by Atomic Absorption Spectrometry ... 1251

L

Lalitha, K. S., N. V. Parthasaradhy and P. Jayakrishnan
Brush Electropolishing of Brass Tubes ... 815
Lamb, H. J., J. Cote, E. E. Howlett and M. J. Wheeler
The Behavior of Intermetallic Compounds in Aluminum During Sulfuric Acid Anodizing: 1: Al-Mn, Al-Fe, AlMgSi, Al-Cr Alloys ... 386
Lamb, V. A.
Electroplating With Current Pulses in the Microsecond Range ... 909
Lanza, G. P. and J. L. Marti
Hardness of Sulfamate Nickel Deposits ... 377
Lemons, K. E. and R. L. Cooley
Densities of Electroplated Gold ... 511
Levy, E. M., R. D. MacInnis and T. P. Copps
Iron Electrodeposited from a Sulfate-Chloride Electrolyte: Effects on Microstructure and Microhardness of Current Density, Temperature, pH, and Chloride Ion Concentration ... 533
Levy, E. M.
Nickel-Iron Alloys Electrodeposited from a Sulfate-Chloride Electrolyte: The Effects on Mechanical Properties and Microstructure of Stress-Reducing Agent, Heat Treatment, pH, and Chemical Composition ... 903
Litsch, H. J.
A Unique Electroplating Area Design for Semi-conductor Precious Metal Finishing ... 543
Logozzo, A. W.
Racking for Hard Chromium Plating ... 1019
Lost Opportunity (Editorial) C. G. Borlet ... 124
Lyons, J. W., R. H. Baugh and H. L. Vandersall
Determination of Nitric Acid in Aluminum Polishing Baths ... 185

M

MacInnis, R. D., T. P. Copps and E. M. Levy
Iron Electrodeposited from a Sulfate-Chloride Electrolyte: Effects on Microstructure and Microhardness of Current Density, Temperature, pH, and Chloride Ion Concentration ... 533
Marti, J. L. and G. P. Lanza
Hardness of Sulfamate Nickel Deposits ... 377
Matulis, J., A. Bodnevas and M. Vainilaviciene
Influence of Class II Brighteners on the Nature of Saccharin Decomposition in Nickel Electrodeposition ... 1147
Maurin, G., M. Froment and I. Epelboin
Growth and Structure of Metals Obtained by Electrocrystallization ... 1356
Measurement and Control of Electrodeposition Stresses, F. J. Schmidt ... 395
Mechanical Properties of Single-Crystal Copper Electrodeposits, R. Sard and R. Weil ... 157
Meserve, H. O. Jr.
Chemical Milling Applied to Jet Airliner Body Skins ... 44
Metal Finishing, Unique Electroplating Area Design for Semiconductor Precious, A, H. J. Litsch ... 543
Metals, Analysis of Electroplated, by Atomic Absorption Spectrometry, T. Y. Kometani ... 1251
Metals, Codeposition of Finely Dispersed Particles with, T. W. Tomaszewski, L. C. Tomaszewski and H. Brown ... 1234
Mitchell, R. L.
General Rack Design ... 1145
Modjeska, R. S.
We Have a Job To Do! (Editorial) ... 989
Mohrnheim, A. F.
Air Pollution and the Metal Finishing Industry ... 291
Rinsing Process Dynamics: Practical Relations and Time-Concentration Graphs for Rinsing at Regular Intervals in Tank with Constant Rinse Flow ... 715
Mular, A. L. and J. T. N. Atkinson
Experimental Design and Optimization in Electroplating ... 1254
Munier, G.
Polymer Codeposited With Gold During Electroplating ... 1151
Murphy, N. F. and E. F. Swansey
Application of a Direct Tensile Joint Strength Test to Electroless Plated Plastic, The ... 371

N

NICKEL

Cobalt-Nickel Electrolyte, Continuous Spectrophotometric Analysis of a Watts Type, J. C. Sadak and F. K. Sautter ... 1041
Nickel Deposition, Electroless: Effect of Organic Salts on Rate, K. A. Holbrook and P. J. Twist ... 523
Nickel Deposition, Initial Stages of,: II. Effect of Addition Agents, M. H. Jones and M. G. Kenez ... 537
Nickel Deposits, Control of Phosphorus Content and Stresses in Electroless, The, B. C. Bartlett, L. Cann and J. L. Hayward ... 168
Nickel Deposits, Hardness of Sulfamate, J. L. Marti and G. P. Lanza ... 377
Nickel Electrodeposition, Influence of Class II Brighteners on the Nature of Saccharin Decomposition in, J. Matulis, A. Bodnevas and M. Vainilaviciene ... 1147
Nickel-Iron Alloys Electrodeposited from a Sulfate-Chloride Electrolyte: The

Effects on Mechanical Properties and Microstructure of Stress-Reducing Agent, Heat Treatment, pH, and Chemical Composition, E. M. Levy ... 903
Nucleation and Growth of Some Electrodeposited Materials on Graphite, The, W. A. Nystrom ... 285
Nystrom, W. A.
Nucleation and Growth of Some Electrodeposited Materials on Graphite, The .. 285

O

OBITUARIES

Bender, R. C. ... 325
Benner, H. L. ... 1307
Blum, D. C. ... 749
Carpenter, A. E. ... 861
Carroll, J. L. ... 439
Clair, F. ... 831
Garceau, R. F. ... 639
Klink, G. ... 110
McDowell, C. ... 110
Mitchell, T. ... 1078
Olsen, R. ... 324
Ruesch, R. R. ... 831
Sax, B. P. ... 110
Vouglas, J. G. ... 861
Walen, E. A. ... 324
Walen, E. A., Jr. ... 439
Wilson, A. B. ... 831

P

Palladium Deposition, Electroless, F. Pearlstein and R. F. Weightman ... 1158
Palladium, Electrodeposition of, and Platinum From Aqueous Electrolytes, S. D. Cramer and D. Schlain ... 516
Parthasaradhy, N. V., P. Jahakrishnan and K. S. Lalitha
Brush Electropolishing of Brass Tubes ... 815
Peihoda, W. W. and E. J. Pritchard
Recovery of Gold From Rinse Waters Using Ion-Exchange Techniques ... 1044
Pearlstein, F. and R. F. Weightman
Electroless Palladium Deposition ... 1158
Physical and Mechanical Properties of Electroformed Gold-Copper Alloys, H. J. Wiesner and W. B. Distler ... 799
Plastic, Electroless Plated, The Application of a Direct Tensile Joint Strength Test to, N. F. Murphy and E. F. Swansey ... 371
Plastics:, Chromium-Plated ABS and Polypropylene, Performance in Typical Tests, W. P. Innes, J. J. Grunwald, E. D. D'Ottavio, W. H. Toller, and C. Carmichael .. 51

PLATING/FINISHING PRACTICE

Adjusting to the Nickel Shortage, F. O'Neill ... 1325
Automating a Manual Plating Shop ... 1205
Bright Zinc Plating Carbo-nitrided Fasteners ... 893
Corrosion of Lead and Lead Alloys in Chromium Plating Solutions, L. H. Esmore ... 238
Electroforming Automation at Columbia Records, P. Bailin ... 658
Electroplating and Other Wear Resistant Finishes on Rolls-Royce Engines, B. Helan ... 770
Experiences with Non-Cyanide Zinc Plating ... 21
Finishing Household Products, R. L. Bowers ... 233
Gold Plating at Philco-Ford's Microelectronics Division, W. N. Karacas ... 464
Molding and Quality Analysis of ABS Substrates, J. F. Zappala ... 459
New Printed Circuit Production Techniques Achieve Finer Tolerances, Uniformity, C. M. Smith ... 346
Nickel Substitutes, F. J. Kaim ... 1199
Plasma-Plating At 30,000F For Wear-Resistant Coatings, P. Francois ... 1334
Plating on Plastics—A Pragmatic Look at the Problems, S. E. Beacom ... 129
Plating Zinc Die Castings with Bright Acid Copper ... 11
Printed Circuit Etching Facilities and Processes, R. R. C. Benton ... 992
Refractive Index . . . A Time Saver for the Plater, J. Dickens and L. E. Shaffer ... 1104
Taking the Art Out of Anodizing, F. O'Neill ... 1100
The Use of Catalytic Basis Materials and Ductile Electroless Copper Deposition in the Manufacture of Printed Wiring, A. Adler and D. W. Powers ... 880
Vibratory Finishing for Zinc Die Castings ... 1211

PLATING TOPICS

Air Pollution and the Metal Finishing Industry, A. F. Mohrnheim ... 291
Brush Electropolishing of Brass Tubes, P. Jayakrishnan, N. V. Parthasaradhy and K. S. Lalitha ... 815
Controlling Gold Consumption in Electroplating, J. G. Donaldson ... 719
Recovery of Gold from Rinse Waters Using Ion-Exchange Techniques, E. J. Pritchard and W. W. Peiboda ... 1044
Solderability of Tin-Coated Brass: Subcommittee V, ASTM Committee B-8 .. 819
Some Production Plating Problems and How They Were Solved: Part XXI, E. W. Hoover ... 61
Some Production Plating Problems and How They Were Solved: Part XXII, I. Cross ... 293
Some Production Plating Problems and How They Were Solved: Part XXIII, J. D. Horner ... 546
Some Production Plating Problems and How They Were Solved: Part XXIV, E. W. Hoover ... 929
Styling and Plating—Now and the Trend, D. J. Castle ... 926
Unique Electroplating Area Design for Semi-conductor Precious Metal Finishing, A, H. J. Litsch ... 543
Platinum, Electrodeposition of Palladium and, From Aqueous Electrolytes, S. D. Cramer and D. Schlain ... 516
Pollution, Air, and the Metal Finishing Industry, A. F. Mohrnheim ... 291
Porosity Testing Techniques in Gold Deposits, A. A. Khan ... 1374
Powers, J. H. and D. J. George
Hard Anodic Coatings: Characteristics, Application, and Some Recent Studies on Processing and Testing ... 1240
Pride and Prestige, Of—Practical Values (Editorial), E. A. Blount ... 6
Printed Circuit Boards, Quantitative Method for Adhesion Testing of Multilayer, J. E. Breen and E. Toledo ... 809
Pritchard, E. J. and W. W. Peiboda
Recovery of Gold From Rinse Waters Using Ion-Exchange Techniques ... 1044
Problem: To "Sell" the Electroplating Industry (Editorial) ... 1097
Producing Durable Reticles on Quartz Substrates Combining the Arts of Electrodeposition and Vacuum Deposition, C. E Whitfield Sr. and W. O. Smith Sr. ... 1370

Q

Quantitative Method for Adhesion Testing of Multilayer Printed Circuit Boards, J. E. Breen and E. Toledo ... 809
Quartz Substrates, Producing Durable Reticles on,: Combining the Arts of Electrodeposition and Vacuum Deposition, C. E. Whitfield Sr. and W. O. Smith Sr. ... 1370

R

Racking for Hard Chromium Plating, A. W. Logozzo ... 1019
Recovery of Gold from Rinse Waters Using Ion-Exchange Techniques, E. J. Pritchard and W. W. Peihoda ... 1044
Research on Buffing, M. Hitomi, Y. Tanaka, and Y. Tanaka, condensed and edited by K. J. Gatchel ... 914
Rhodium, Electrodeposition of, from a Molten Sodium Cyanide Electrolyte, G. R. Smith, C. B. Kenahan, R. L. Andrews, and D. Schlain ... 805
Rinsing Process Dynamics: Practical Relations and Time-Concentration Graphs for Rinsing at Regular Intervals in Tank with Constant Rinse Flow, A. F. Mohrnheim ... 715
Rogers, R. R., W. Dingley, and J. Bednar
Improved Silver Cyanide Plating Baths .. 1129
Rothschild, B. F. and D. Sanders
High-Throwing Power Solder (Tin-Lead) Plating Solution ... 1363
Ruthenium Plating, G. A. Conn ... 1038

S

Sadak, J. C. and F. K. Sautter
Continuous Spectrophotometric Analysis of a Watts Type Cobalt-Nickel Electrolyte ... 1041
Sanders, D. and B. F. Rothschild
High-Throwing Power Solder (Tin-Lead) Plating Solution ... 1363
Sard, R. and R. Weil
Mechanical Properties of Single-Crystal Copper Electrodeposits ... 157
Saubestre, E. B., J. Hajdu, and J. Zehnder
Acid Zinc Plating Solutions for Decorative Applications ... 691
Sautter, F. K. and J. C. Sadak
Continuous Spectrophotometric Analysis of a Watts Type Cobalt-Nickel Electrolyte ... 1041
Schlain, D. and S. D. Cramer
Electrodeposition of Palladium and Platinum from Aqueous Electrolytes ... 516
Schlain, D., C. B. Kenahan, G. R. Smith, and R. L. Andrews
Electrodeposition of Rhodium from a Molten Sodium Cyanide Electrolyte ... 805
Schmidt, F. J.
Measurement and Control of Electrodeposition Stresses ... 395
Siefen, J. F.
Format of a Convention, The (Editorial) .. 455
Smith, G. R., C. B. Kenahan, R. L. Andrews, and D. Schlain
Electrodeposition of Rhodium from a Molten Sodium Cyanide Electrolyte ... 805
Smith, W. O., Sr. and C. E. Whitfield Sr.
Producing Durable Reticles on Quartz Substrates Combining the Arts of Electrodeposition and Vacuum Deposition. 1370
Solderability of Tin-Coated Brass: Subcommittee V, ASTM Committee B-8 819
Solder (Tin-Lead) Plating Solution, High-Throwing Power, B. F. Rothschild and D. Sanders ... 1363
Some Production Plating Problems and How They Were Solved: Part XXI, E. W. Hoover ... 61
Some Production Plating Problems and How They Were Solved: Part XXII, I. Cross. 293
Some Production Plating Problems and How They Were Solved: Part XXIII, J. D. Horner ... 546
Some Production Plating Problems and How They Were Solved: Part XXIV, E. W. Hoover ... 929
Spooner, R. C.
High Acetic Acid Salt Spray Test for Aluminum Alloys ... 1047
Steinmetz, R. W. and T. H. Briggs
Analytical Investigations of Defective Electroplated Parts ... 163
Stimetz, C. J., W. B. Harding, and F. A. Clay
Electrodeposition of Aluminum ... 1027
Stutzman, P. G. and J. P. Branciaroli
Black Chrome Plating: Application and Deposit Characteristics of a New Plating Process ... 37
Styling and Plating—Now and the Trend, D. J. Castle ... 926
Swalheim, D. A.
AES Expands Educational Program (Editorial) ... 877
Swansey, E. F. and N. F. Murphy
The Application of a Direct Tensile Joint Strength Test to Electroless Plated Plastic ... 371

T

Tanaka, Y., Y. Tanaka, and M. Hitomi
Research on Buffing (Condensed and edited by K. J. Gatchel) ... 914
Tanaka, Y., M. Hitomi and Y. Tanaka
Research on Buffing (Condensed and edited by K. J. Gatchel) ... 914

TECHNICAL BRIEFS

Applying Hard Anodic Aluminum Coatings to Various Substrates, H. R. Johnson ... 931
Tenth William Blum Lecture—The Nucleation Dependent Growth Layer—A Structure Element in Electrocrystallization, H. Fischer ... 1229
Electroforming a Mold Cavity for Injection Molding, S. J. Beyer ... 60
High Acetic Acid Salt Spray Test for Aluminum Alloys, R. C. Spooner ... 1047
Toledo, E. and J. E. Breen
Quantitative Method for Adhesion Testing of Multilayer Printed Circuit Boards ... 809
Toller, W. H., C. Carmichael, W. P. Innes, J. J. Grunwald, and E. D. D'Ottavio
Chromium-Plated ABS and Polypropylene Plastics: Performance in Typical Tests ... 51
Tomaszewski, L. C., T. W. Tomaszewski, and H. Brown
Codeposition of Finely Dispersed Particles with Metals ... 1234
Tomaszewski, T. W., L. C. Tomaszewski, and H. Brown
Codeposition of Finely Dispersed Particles with Metals ... 1234
Twist, P. J. and K. A. Holbrook
Electroless Nickel Deposition: Effect of Organic Salts on Rate ... 523

U

Unique Electroplating Area Design for Semiconductor Precious Metal Finishing, A, H. J. Litsch ... 543

V

Vainilaviciene, M., J. Matulis, and A. Bodnevas
Influence of Class II Brighteners on the Nature of Saccharin Decomposition in Nickel Electrodeposition ... 1147
Vandersall, H. L., R. H. Baugh, and J. W. Lyons
Determination of Nitric Acid in Aluminum Polishing Baths ... 185

W

Wallace, W. A., V. P. Greco, and J. N. L. Cesaro
Bond Strength Characteristics of Electrodeposited Nickel on Boron and Silicon Carbide Filaments (Reinforced Composites) ... 262
Waste, Complete Removal of Chromic Acid, With the Aid of Instrumentation, G. B. Hill ... 172
Wear-Resistance of Gold Alloy Electrodeposits, W. Flühmann ... 1351
Weaver, J. H.
Bright Anodized Aluminum Temperature Control Coatings: Effect of Vacuum-Ultraviolet Environment on Optical Properties ... 271
We Have a Job To Do! (Editorial), R. S. Modjeska ... 989
Weightman, R. F. and F. Pearlstein
Electroless Palladium Deposition ... 1158
Weil, R. and R. Sard
Mechanical Properties of Single-Crystal Copper Electrodeposits ... 157
West, D. C., M. E. Farmer, and C. G. Darlington

Iron Plating from the Fluoborate Bath Without Organic Additions..... 699
Wheeler, M. J., H. J. Lamb, J. Cote, and E. E. Howlett
The Behavior of Intermetallic Compounds in Aluminum During Sulfuric Acid Anodizing: 1: Al-Mn, Al-Fe, AlMgSi, Al-Cr Alloys..... 386
Whitfield, C. E., Sr. and W. O. Smith Sr.
Producing Durable Reticles on Quartz Substrates Combining the Arts of Electrodeposition and Vacuum Deposition. 1370
Wiesner, H. J. and W. P. Frey
Electrodeposition of Thick Deposits of Gold-Copper Alloys, The, Process Development..... 527
Wiesner, H. J. and W. B. Distler
Physical and Mechanical Properties of Electroformed Gold-Copper Alloys.... 799

Y

Your Society Copes With Change (Editorial) 1319

Z

Zehnder, J., E. B. Saubestre, and J. Hajdu
Acid Zinc Plating Solutions for Decorative Applications..... 691
Zinc Plating, Neutral Chloride, K. P. Bellinger..... 1135
Zinc Plating Solutions for Decorative Applications, Acid, E. B. Saubestre, J. Hajdu, and J. Zehnder..... 691

PATENT ABSTRACTS

A

ALUMINUM
Aluminum Plating—3,449,144, 6/69—B. J. Williams and E. L. Hatlelid..... 1180
Anodizing Aluminum—3,411,994, 11/68—E. L. Wainer..... 633
Plating on Aluminum—3,408,211, 10/68—H. J. Coates..... 861

ANODES
Activating Anodes—3,450,605, 6/69—J. F. McGivern Jr..... 1181

ANODIZING
Anodizing Titanium—3,410,766, 11/68—P. F. Schmidt..... 633
Protective Anodic Coating—3,400,058, 9/68—E. C. Ross and B. Chambers.... 190

B

BLACKENING
Method for Blackening Surfaces—3,447,-974, 6/69, E. B. Saubestre and J. Hajdu 1180

BRASS
Brass Plating—3,440,152, 4/69—J. A. Lisowski et al..... 965

BRONZE
Bronze Plating—3,440.151, 4/69—R. Duva and B. Katz..... 965

C

CADMIUM
Bright Zinc and Cadmium Plating—3,-411,996, 11/68—J. D. Rushmere..... 633
Cadmium Plating—3,442,776, 5/69—W. Ruff and H. Boncher..... 965
Electrolytic Method for Preparing Electrochemically Active Cadmium—3,400,-056, 9/68—S. Hills..... 190

CAST IRON
Chromium Plating Cast Iron—3,421,986, 1/69—W. Ruff and H. Boucher..... 750
Plating on Cast Irons—3,411,995, 11/68—E. B. Saubestre and T. J. Wieczorek... 633

CHROMIUM
Black Chromium Coating—3,419,481, 12/68—J. B. Nelson Jr..... 750
Black Chromium Plating—3,454,474, 7/69—R. M. Woods and D. R. Moul..... 1302
Chromium Plating—3,414,492, 12/68—G. E. Oleson and R. M. Woods..... 634
Chromium Plating Cast Iron—3,421,986, 1/69—W. Ruff and H. Boucher..... 750
Chromium Plating Process—3,418,221, 12/68—R. M. Woods and D. R. Moul.. 634
Chromium Plating Process—3,442,777, 5/69—R. M. Woods and D. R. Moul.. 965
Electrodeposition of Chromium—3,408,-272, 10/68—T. E. Such and M. Partington..... 633
Mist Suppressors for Chromium Baths—3,423,297, 1/69—J. Van Der Horst.... 861
Stop-Off for Chromium Plating—3,415,-723, 12/68—R. D. Bedi and G. Dubpernell..... 634

COBALT
Electroless Cobalt—3,446,660, 5/69—W. N. Dunlap Jr. et al..... 1180
Electroless Cobalt Bath—3,416,955, 12/68—M. P. Makowski..... 634
Electroless Cobalt Bath—3,416,932, 12/68—J. S. Mathias and J. J. McGee..... 634

CONVERSION COATING
Chromate Conversion Coating—3,410,707, 11/68—W. E. Popcock and S. R. Brown 633

COPPER
Bright Copper Plating—3,414,493, 12/68—F. I. Nobel and B. D. Ostrow..... 634
Electroless Copper—3,454,416, 7/69—K. Heymann and H. Grundel..... 1302
Electroless Copper—3,436,233, 4/69—H. Jackson..... 954
Electroless Copper—3,453,123, 7/69—R. Merker and S. Lucca..... 1181
Electroless Copper—3,457,089, 7/69—C. R. Shipley Jr. and M. Gulla..... 1302
Electroless Copper Bath—3,415,666, 12/68—S. Nagai et al..... 634
Leveling Acid Copper Plating Bath—3,400,059, 9/68—G. Michael and W. D. Willmund..... 190

E

ELECTRODES
Electrode—3,410,785, 11/68—P. J. Clough and R. W. Stevens..... 633
Noble Metal Electrode—3,428,544, 2/69—G. Bianchi and A. Nidola..... 862

ELECTROFORMING
Electroforming—3,454,376, 7/69—B. M. Luce and B. L. Berdan..... 1302
Stress Measurement in Electroforming—3,437,568, 4/69—D. E. Hasselmann et al..... 964

ELECTROLESS PLATING
Electroless Cobalt Bath—3,416,955, 12/68—M. P. Makowski..... 634
Electroless Cobalt Bath—3,416,932, 12/68—J. S. Mathias and J. J. McGee..... 634
Electroless Copper—3,436,233, 4/69—H. Jackson..... 964
Electroless Copper Bath—3,415,666, 12/68—S. Nagai et al..... 634
Electroless Lead—3,409,466, 11/68—B. G. Slay Jr. et al..... 633
Electroless Plating—3,432,338, 3/69—R. E. Sickles..... 1302
Electroless Plating—3,431,120, 3/69—L. M. Weisenberger..... 862
Electroless Plating for Printed Circuits—3,443,988, 5/69—J. F. McCormack and F. W. Schneble Jr..... 1080
Pre-conditioning a Nonmetallic Surface for Electroless Plating—3,421,922, 1/69—B. W. Wilson..... 750
Sensitizing for Electroless Deposition—3,414,427, 12/68—J. P. Levy..... 633
Stabilizing Electroless Baths—3,403,035, 9/68—F. W. Schneble Jr..... 190

EQUIPMENT
Automatic Plating Apparatus—3,420,766, 1/69—I. L. Michelson..... 750
Electroplating Apparatus—3,429,797, 2/69—W. H. Jackson and R. C. Kayser... 862
Electroplating Apparatus—3,409,531, 11/68—J. M. Ryerson et al..... 633
Electroplating Apparatus—3,436,330, 4/69—M. Wright and J. W. Healy..... 964
Electroplating Tank—3,450,625, 6/69—K. C. Ramsey and W. Morris..... 1181
High Speed Plating Apparatus—3,415,732, 12/68—J. S. Komjathy..... 634
Plating Apparatus and Process—3,436,-332, 4/69—L. L. Good et al..... 964
Robber Control for Electroplating—3,437,578, 4/69—N. R. Gibbs and J. R. Herriges..... 964
Test Plating Equipment and Method—3,412,004, 11/68—J. B. Winters..... 633

G

GOLD
Gold Plating—3,445,352, 5/69—G. I. Edson..... 1080
Gold Plating—3,423,295, 1/69—L. Greenspan..... 750
Gold Plating—3,427,231, 2/69—E. B. Schneider and M. E. Lindell..... 862
Gold Recovery—3,431,187, 3/69—L. E. Lancy..... 1302
Recovery of Electroplate—3,442,643, 5/69—E. B. Ackerman..... 965

I

IRON
Iron Plating—3,404,074, 10/68—O. J. Klingenmaier..... 190

M

MAGNETIC COATINGS
Electrodepositing Magnetic Coating—3,442,774, 5/69—C. Le Mehaute..... 965
Plating Magnetic Coating—3,423,214, 1/69—H. Koretzky..... 750

MANGANESE
Electrowinning Manganese—3,445,799, 7/69—D. L. Mantell and G. R. Ferment.. 1302

MECHANICAL PLATING
Mechanical Plating—3,443,985, 5/69—J. E. Cutcliffe..... 1080

N

NICKEL
Activating Tin-Nickel Surface—3,427,181, 2/69—S. H. Lowery and G. C. Wilson.. 862
Auxiliary Nickel Anode—3,449,224, 6/69—G. A. Di Bari et al..... 1181
Brighteners for Nickel Plating Baths—3,400,152, 9/68—D. G. Block et al.... 190
Bright Nickel Electroplating—3,401,097, 9/68—R. Muker et al..... 190
Bright Nickel Plating Bath—3,428,536, 2/69—J. C. Towle et al..... 862
Electroless Nickel—3,419,419, 12/68—R. R. Wright..... 750
Electroless Nickel Plating—3,420,680, 1/69—M. Gulla..... 750
Electroless Nickel Plating—3,441,428, 4/69—G. C. Reinhard and M. W. O'Mara 965
Electroless Nickel Plating—3,424,597, 1/69—C. R. Shipley Jr..... 861
Electrolytic Nickel—3,437,571, 4/69—L. S. Renzoni et al..... 964
Leveling Nickel Electroplating—3,414,-491, 12/68—A. H. Du Rose and W. J. Pierce..... 634
Leveling Nickel Plating Bath—3,423,296, 1/69—J. L. Levasseur..... 750
Nickel/Chromium Coating—3,449,223, 6/69—J. M. Odeberken..... 1181
Nickel Plating—3,417,005, 12/68—M. L. Baig..... 634
Nickel Plating—3,429,789, 2/69—B. D. Ostrow and F. I. Nobel..... 862
Nickel Plating Bath—3,444,056, 5/69—C. Richter and R. Erdmann..... 1080
Zinc-Nickel Alloy Plating—3,420,754, 1/69—E. J. Roehl..... 750

P

PLATING ON PLASTICS
Plating on Nonmetallic Bodies—3,423,-226, 1/69—D. P. Jensen..... 750
Plating on Plastics—3,438,798, 4/69—D. W. Baudrand and G. O. Mallory Jr.... 965
Plating on Plastics—3,425,946, 2/69—W. M. Emons Jr. and S. Charms..... 862
Plating on Plastics—3,437,507, 4/69—D. P. Jensen..... 964
Plating on Plastics—3,445,350, 5/69—K. A. Klinger et al..... 1080

PLATINUM
Deposition of a Catalytic Platinum Metal—3,423,228, 1/69—E. A. Oster..... 750
Electropolishing Platinum—3,419,485, 12/68—R. Seegmiller and J. K. Gore..... 750
Noble Metal Electrode—3,428,544, 2/69—G. Bianchi and A. Nidola..... 862
Platinum-Coated Metal Article—3,432,-278, 3/69—R. S. Richard..... 1302

PYROPHOSPHATES
Producing Metal Pyrophosphates—3,401,-012, 9/68—G. D. Nelson..... 190

S

SILVER
Bright Silver Plating—3,446,716, 5/69—J. Kornium and H. J. Steeg..... 1080
Bright Silver Plating—3,425,917, 2/69—H. Offermanns and W. Skaliks..... 862
Non-Cyanide Silver Plating Bath—3,406,-107, 10/68—K. R. Grebe and J. V. Powers..... 861
Silver Plating—3,427,232, 2/69—J. W. Natwick..... 862

STEEL
Descaling Steel—3,420,760, 1/69—B. J. Freedman..... 750
Reclaiming Spent Electrolytes—3,407,129, 10/68—A. W. Petrocelli et al..... 861

T

TIN
Bright Acid Tin Process—3,429,790, 2/69—C. J. Schoot and J. J. Ponjee..... 862
Bright Tin Bath—3,404,075, 10/68—J. K. Aiken and D. K. Howard..... 190
Bright Tin Coating—3,445,351, 5/69—D. A. Swalheim and R. W. Mackey... 1080
Tin Plating—3,453,186, 7/69—N. L. Hause and D. A. Swalheim..... 1181
Tin Plating—3,455,794, 7/69—F. Passal and A. J. Tomson..... 1302

V

VAPOR DEPOSITION
Vapor Deposition—3,415,672, 12/68—M. A. Lovinstein and J. W. Grenier..... 634

Z

ZINC
Bright Zinc and Cadmium Plating—3,-411,996, 11/68—J. D. Rushmere..... 633
Bright Zinc Plating—3,454,475, 7/69—J. D. Rushmere and W. H. Todd..... 1302
Metal Treating—3,446,715, 5/69—S. S. Frey..... 1180